- random and block copolymers of ether oxides such as copolymers of the polyoxyalkylene type having an LCST like polyoxyethylene/polyoxypropylene and polyoxyethylene/polyoxybutylene,

- alkylene homo- and copolymers like butylene-propylene, ethylene-propylene and ethylene-butylene, and

- polyacrylic derivatives derived from the homopolymerization or copolymerization of monomers chosen from acrylic and methacrylic acids, alkyl acrylates and methacrylates such as hydroxypropyl and hydroxyethyl acrylates, N-alkyl-acrylamides or -methacrylamides such as N-ethylacrylamide, N-isopropylacrylamide, N',N-dialkyl-acrylamides or -methacrylamides, aryl-acrylamides or -methacrylamides and alkylaryl-acrylamides or -methacrylamides.

More preferably, the copolymer used according to the invention comprises at least two noncontiguous segments with an LCST property derived from the homo- or copolymerization of monomers chosen from acrylic and methacrylic acids, N-alkyl-acrylamides or -methacrylamides such as N-ethylacrylamide, N-isopropylacrylamide, aryl-acrylamides or -methacrylamides and alkylaryl-acrylamides or -methacrylamides.

Thus, it is possible to use, by way of example and without limitation, as segments with LCST, N-isopropylacrylamide (NIPAM), N-isopropylmethacrylamide, N,N'-diethylacrylamide, or random copolymers of these monomers with each other or with others.

The following copolymers are most particularly suitable for the invention:

- copolymers of the comb copolymer type whose skeleton is of the type including acrylamide, acrylic acid, acryloylaminoethanol or dimethacrylamide and on which there are grafted side segments of the poly(N-alkyl or N,N-dialkyl)acrylamide type, preferably of the poly(N-isopropylacrylamide) type, or side segments of the random or block, polyoxyethylene/oxypropylene copolymer or polyoxypropylene type, or more generally side segments of the polyether type which are notably more hydrophobic than polyoxyethylene

- copolymers of the block copolymer type exhibiting along their skeleton an alternation of segments of the polyoxyethylene type and of segments of the polyoxypropylene type, or an alternation of segments of the polyoxyethylene type and of segments of the polyoxybutylene type or more generally an alternation of segments of polyethylene and of segments of the polyether type which are notably more hydrophobic than polyoxyethylene.

By way of examples, it is possible to use, as copolymers, in the claimed separation medium, copolymers chosen from polyacrylamide/poly(N-isopropylacrylamide) (PAM-NIPAM); polyvinylalcohol/poly(N-isopropylacrylamide) (PVA-NIPAM), polyoxyethylene/polyoxypropylene, polyacrylamide/oxyethylene-oxypropylene copolymer, polyacrylamide/polyoxypropylene, polyacrylic acid/polyoxypropylene, polyacrylic acid/oxyethylene-oxypropylene copolymer, polyacrylic acid/poly(N-isopropylacrylamide) and polydimethylacrylamide/poly(N-isopropylacrylamide) (PDMAM-NIPAM).

It is possible to advantageously use a medium comprising a comb copolymer carrying along the polyacrylamide skeleton segments with LCST essentially consisting of poly-NIPAM, and comprising along their

skeleton a number of carbon atoms between 35 and 600, and the total mass fraction of which does not exceed 25%.

It should also be noted that in the majority of applications, and in particular for separating charged analytes, it is preferable to use a polymer according to the invention which is essentially neutral. It may however be useful in some applications, and in particular for separating weakly charged or uncharged analytes, or analytes which tend to combine with the polymer, to choose a polymer according to the invention which is deliberately charged. It will be possible to conveniently prepare polymers of this type, for example, by allowing a substantial portion of polymerized acrylic acid to be present in the segments soluble in the electrolyte at the temperatures T1 and T2. A copolymer of this type is more particularly described in Example 10 below.

As regards more particularly the copolymer concentration in the medium, it is generally less than 20 g/100 ml by weight. For DNA sequencing applications, it is preferably between about 1 and 8 g/100 ml by weight.

According to a particular embodiment of the invention, the copolymers used in the said medium are advantageously capable, from a concentration of the order of 5 g/100 ml and preferably of the order of 2 g/100 ml by weight, of causing the said medium to reversibly transit from a viscosity state V1, obtained at a temperature T1, to a viscosity state V2 which is at least 100% greater than V1 and which is obtained at a temperature T2 which is at least 20°C greater than T1.